

THE STATUS OF *ASTER SCABRICAULIS* (ASTERACEAE: ASTEREAE), AN  
ENDEMIC OF THE GULF COASTAL PLAIN

Guy L. Nesom

Texas Regional Institute for Environmental Studies, Sam Houston State University,  
Huntsville, Texas 77341-2506 U.S.A.

ABSTRACT

*Aster scabricaulis* is a rare entity of wet habitats on the Gulf Coastal Plain, now known from seven counties of northeastern Texas, one of northwestern Louisiana, and two of central Mississippi. These plants were originally described at specific rank but more recently have been treated as a variety of *A. puniceus*. The latter view is maintained here, as *A. scabricaulis* is weakly but consistently differentiated in morphology and set apart in geographic distribution from the main population system of *A. puniceus*, which has a more northern and montane distribution. Variation in *A. puniceus* is reviewed, and observations on morphology and habitat, specimen citations, and a distribution map are provided for var. *scabricaulis*. All taxa considered are members of the segregate genus *Symphotrichum*, where the correct name for the coastal plain endemic is *S. puniceum* var. *scabricaule* (Shinners) Nesom.

KEY WORDS: *Aster scabricaulis*, *Aster puniceus*, *Aster elliotii*, *Symphotrichum*, Astereae, Asteraceae, systematics

*Aster scabricaulis* Shinners was formally described (Shinners 1953) on the basis of collections from Smith County and Van Zandt County of northeastern Texas. In the original description, Shinners observed (p. 157) that "Future revision of the *A. puniceus* complex may reduce [*A. scabricaulis*] to varietal rank, but it appears about equally related to [*A. puniceus* L., *A. firmus* Nees, and *A. nebraskensis* (Britt.) Wieg. (= *A. praealtus* Poir. sensu lato)]." *Aster scabricaulis* was maintained at specific rank by Correll & Johnston (1970) but treated by Jones (1984, 1987) as a variety of *A. puniceus*. Its geographic range is considerably expanded with data summarized in the present report, but its rarity is little reduced. *Aster scabricaulis* is under consideration for listing as an endangered entity, with a current Nature Conservancy ranking of G5T2S2.

With assistance from the Texas Parks & Wildlife Department and the U.S. Fish & Wildlife Service, I studied native populations of *Aster puniceus* in North Carolina and

South Carolina, and *A. scabricaulis* in Texas within a single week (23-28 October 1995), making direct comparisons of habitat and morphology, taking color photographs, and sampling population variability for laboratory study. In addition, I have studied specimens of both entities from over their geographic range.

#### Taxonomic background.

In a review of the systematics of *Aster* sensu lato (Nesom 1994), *A. scabricaulis* was treated at varietal rank within *A. puniceus*. All nomenclature for these entities now belongs within the genus *Symphotrichum* Nees, consistent with the hypothesis that Old World asters (including the generitype of *Aster* L.) are phyletically independent from the New World species (Nesom 1994). Because of the historic components to the following discussion, however, previous names in *Aster* are used.

Jones's broadened concept of *Aster puniceus* (1984, 1987) not only included *A. scabricaulis* but also two other taxa, each of which she recognized at both varietal and subspecific rank: *A. firmus* (including *A. lucidulus* [A. Gray] Wieg.) and *A. elliotii* Torrey & Gray. She treated *A. puniceus* var. *scabricaulis* (Shinners) A.G. Jones within *A. puniceus* subsp. *elliotii*. In brief justification of her rearrangement, Jones (1984, p. 384) noted only that the "affinities [of var. *scabricaulis*] clearly lie with *A. puniceus*. Characteristics of the leaves, rhizomes, and capitula relate the taxon to subsp. *elliotii*."

A similarity between *Aster elliotii* and *A. puniceus* was also observed by Radford *et al.* (1968), who suggested that the two might be combined as a single species. In formally combining the two, Jones (1984, p. 384) observed that "Although the extreme forms of this taxon can be distinguished from typical *A. puniceus*, there is complete intergradation in regions of sympatry, e.g., in Maryland, Virginia, and Tennessee." But while hybrids may be formed in Maryland and Virginia, the habitat of *A. elliotii* is restricted to the outer coastal plain and there is no other area of sympatry with *A. puniceus*. *Aster elliotii* does not occur in Tennessee (Wofford & Kral 1993). Both species occupy broad ranges. Cronquist (1980; Gleason & Cronquist 1991) maintained these two as separate species, and my examination of both entities leads to the same conclusion. The current study proceeds on the basis that *A. elliotii* is morphologically and geographically distinct from *A. puniceus* as well as its closest relatives (see key below for a summary of differences). There is no evidence to confirm Jones's mostly implied observation of greater similarity between *A. scabricaulis* and *A. elliotii* than between *A. scabricaulis* and *A. puniceus*.

*Aster firmus* has previously been treated within *A. puniceus* (e.g., Torrey & Gray 1841; Gray 1884; Semple *et al.* 1983; Jones 1989), sometimes at varietal rank. In contrast, Cronquist (1980, and in Gleason & Cronquist 1991) and Barkley (1986) have maintained *A. firmus* as a separate species (see key below for summary of differences). They were treated as separate species in my *Aster* review (Nesom 1994) but the more conservative view is more widely accepted in current treatments, as further considered in the discussion below.

*Aster praealtus* was included by Shinnery among the species he saw as most closely related to *A. scabricaulis*, but I have seen no evidence to indicate the involvement of *A. praealtus* with any aspect of variation in *A. scabricaulis*. The former is distinguished from *A. scabricaulis* by its reduced stem pubescence, narrow, entire leaves with slightly revolute margins and barely subclasping bases, venation of isodiametric areolae, the nearly cylindrical arrangement of heads at the branch tips, more constricted chlorophyllous zone of the phyllaries, and the abruptly ampliate disc corollas.

#### Distribution and habitat of *Aster scabricaulis*.

The localities known for *Aster scabricaulis* have increased in number since its original description, and the total extent of its geographic range in Texas has been broadened to seven closely associated northeastern Texas counties (Map 1; Specimens Examined). Known localities were revisited and new ones discovered in 1993, 1994, and 1995 by personnel of the Texas Natural Heritage Program. Their additional observations and detailed comments on habitat and present status and abundance of these plants are now on computerized records maintained as the Biological Conservation Database by the Texas Parks & Wildlife Department. The species also was the subject of a brief biological and taxonomic summary in a status report by Mahler (1984).

*Aster scabricaulis* is rare in Texas. At a number of its known localities, only one or a few plants exist. Even in the last five years, the number of individuals in all localities apparently has dropped markedly, even to the point of extirpation in several of them. This entity is rare in Mississippi and probably now extinct in Louisiana.

The range of *Aster scabricaulis* is significantly expanded by the confirmation of localities for it in Louisiana and Mississippi. The relatively early Louisiana collection by R.S. Cocks (made ca. 1910, *vide* A. Bradburn, the label data without the year of collection) was originally identified as *A. puniceus*, annotated as *Aster praealtus* by R. Pavlu in 1976, as "*A. cf. puniceus*" by A.G. Jones in 1980, and included in the *Asteraceae* of Louisiana as *A. puniceus* by Gandhi & Thomas (1989). It is likely that Cocks made this collection from one of the boggy habitats well-known in the Kisatchie area of Natchitoches Parish, but such a plant has not been located in recent intensive studies of these habitats and this region in general (MacRoberts 1988, 1990, 1991, and pers. comm.). The Cocks collection is the only representative of this species known from Louisiana.

The first Mississippi records of *Aster puniceus* (*A. scabricaulis*) were collected in 1978 and correctly identified by Sidney McDaniel from a low, wet area in Lauderdale County. Two other closely situated populations were discovered in 1986 and 1987 by Wayne Morris in springhead bogs of Grenada County (Morris 1988) and identified by Robert Kral.

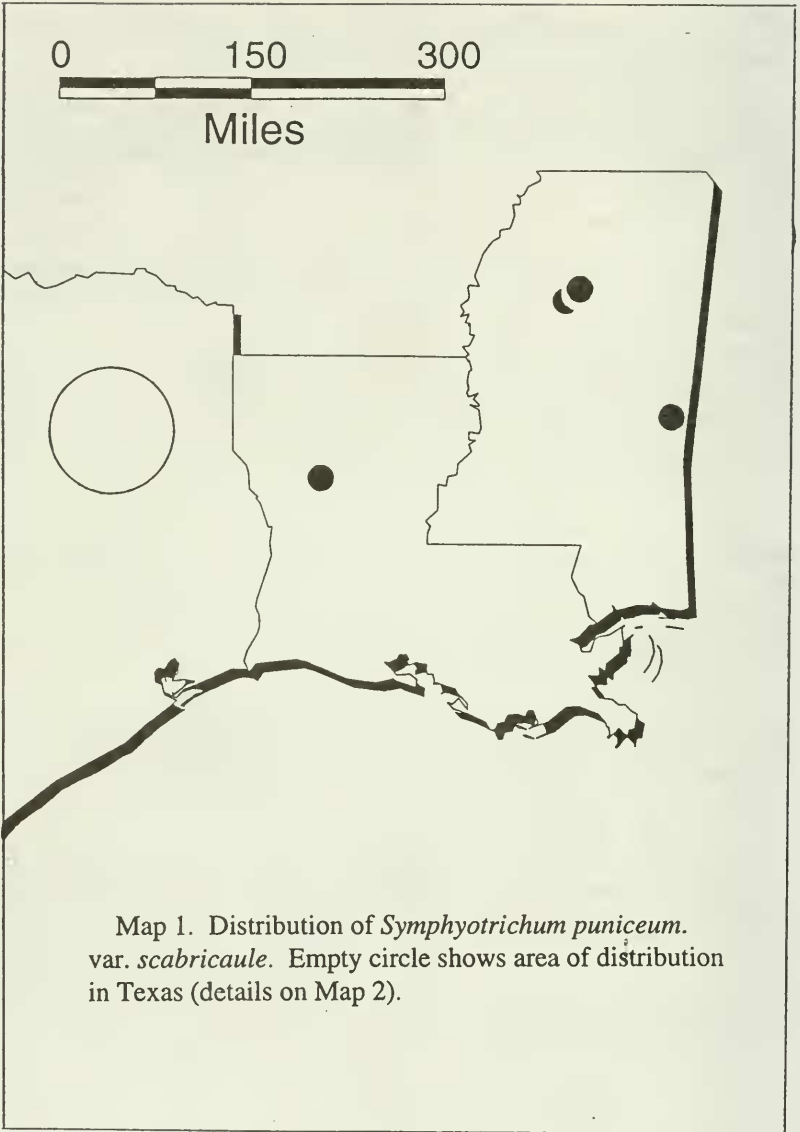
Plants of *Aster scabricaulis* are specialized and restricted in their natural habitat -- they grow in mucky, saturated soil in open sites at the edges of seepage areas, bogs, marshes, and small lakes or in drainage channels associated with these areas. All

Texas sites for *A. scabricaulis* are within an area where the regional vegetation is developed on deep, loose sand derived from deposits of the middle Eocene Claiborne group, chiefly the Carrizo, Sparta, and Queen City formations.

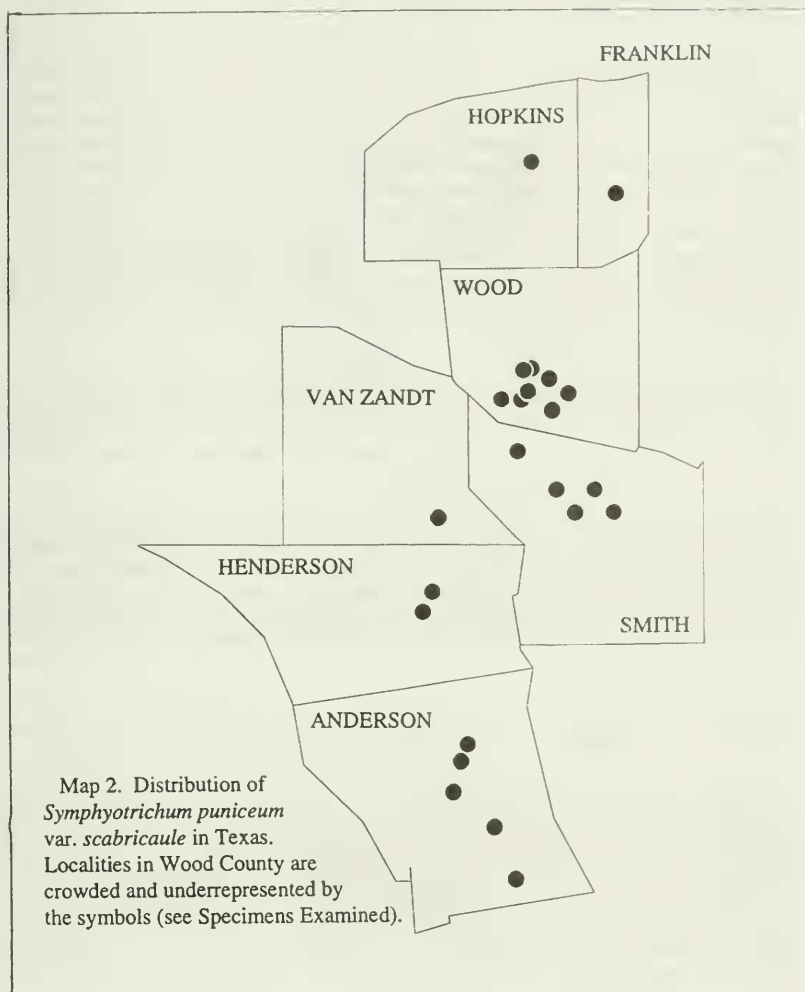
The prevailing vegetation of the Texas region that includes these sites is primarily an oak woodland with scattered pine, sweetgum, and hickory. The dominant species are *Quercus falcata*, *Q. marilandica*, *Q. stellata*, *Q. velutina*, *Q. margaretta*, *Pinus taeda*, *Liquidambar styraciflua*, and *Carya texana*, with scattered *Quercus nigra* and *Nyssa sylvatica*. Common understory species are *Juniperus virginiana*, *Rhus copallina*, *Ulmus alata*, *Sassafras albidum*, *Cornus florida*, and *Acer rubrum*. At the wet sites with *A. scabricaulis*, common and closely associated woody species are *Cephalanthus occidentalis*, *Myrica cerifera*, *Baccharis halimifolia*, *Acer rubrum*, *Salix nigra*, *Alnus serrulata*, and *Betula nigra*. Common herbaceous species at these sites include *Polygonum sagittatum*, *Polygonum punctatum*, *Boehmeria cylindrica*, *Hydrocotyle verticillata*, *Ludwigia* spp., *Mikania scandens*, *Helianthus angustifolius*, *Bidens laevis*, *Aster lateriflorus*, *Solidago rugosa*, *Eupatorium perfoliatum*, *Conoclinium coelestinum*, *Woodwardia areolata*, *Thelypteris kunthii*, *Leersia lenticularis*, *Dichantheium dichotomum*, *Typha domingensis*, *Cyperus* spp., *Scirpus cyperinus*, *Fuirena pumila*, and other Cyperaceae. At sites that are more bog-like, species of *Eriocaulon*, *Xyris*, *Eryngium*, *Doellingeria*, and others also may be found (see Kral 1955).

Most of the known habitats in Texas for *Aster scabricaulis* have been strongly modified by human activity. Most of these sites are along roadway rights-of-way, either in artificially created habitats or in natural sites intersected by roads, where the hydrology has been altered. Kral (1955) studied the "Ben Wheeler site" in Van Zandt Co. and reported the existence of a large bog with dense and characteristic vegetation; this bog apparently is now converted to a small lake with almost no bog vegetation. In this region of Texas, however, habitats similar to those already known for *A. scabricaulis* are abundant (in drainage areas and around impoundments of small to moderate size, all or almost all of these on private property), and hopefully these plants may be situated in other such sites not yet investigated. It may be possible to persuade local land owners to begin populations of *A. scabricaulis* on their property, since it appears that these beautiful plants could be introduced and grown in a number of localities in the immediate area where they now occur but are rare.

Plants of *Aster scabricaulis* have been grown to reproductive maturity both in pots and in normally moist gardens at the Mercer Arboretum in Humble, Texas (Greg Wieland, pers. comm.), which is surprising in view of the apparent restriction of these plants to saturated soil in their natural habitats. Plants have been grown from achenes although the germination percentage appears to be relatively low, and cuttings also are easily propagated and grown to maturity. Further study of germination characteristics and seedling ecology should facilitate the re-establishment of *A. scabricaulis* into habitats within its native region.



Map 1. Distribution of *Symphyotrichum puniceum*. var. *scabriculae*. Empty circle shows area of distribution in Texas (details on Map 2).



### Distribution and habitat of *Aster puniceus*.

*Aster puniceus* occurs from Labrador to Newfoundland and Maine westward to Ontario, southern Manitoba, Saskatchewan, and Alberta, and to Wisconsin, Minnesota, and North Dakota. From New England, it occurs south to Virginia and westward through West Virginia, Indiana, and northern Illinois, with outlying populations in Missouri, Iowa, and Nebraska. *Aster puniceus* reaches the southern limit of its main range in the Appalachian region of North Carolina, South Carolina, Tennessee, and northern Alabama and extends with less abundance into the adjacent piedmont of Georgia and the Carolinas. As suggested by Semple *et al.* (1983) for the origin of outlying western populations of var. *puniceus*, the Gulf Coast populations recognized here as var. *scabricaulis* may also be "glacial relicts" separated from the main range of the species during the Pleistocene. The distribution of the species is summarized in an outline map in Semple *et al.* (1983).

Localities for *Aster puniceus* in coastal parishes of southeastern and south-central Louisiana shown by Gandhi & Thomas (1989) are instead for *A. elliottii* at the western limit of its range (vouchers NLU!) but in typical habitats for that species. The record shown by Gandhi & Thomas for *A. puniceus* in northwestern Louisiana is for *A. puniceus* var. *scabricaulis*, as identified here.

*Aster puniceus* grows in open, wet habitats: swamp margins, marshes, alluvial woods, bogs, ditches, in seepage at the base of steep banks, and on river, stream, and lake banks. In northwestern North Carolina, the species is particularly common in ditches and other drainages associated with the development of roads and agriculture. These habitats occur within various types of regional vegetation, from oak-hickory woodlands to communities characteristic of higher Appalachians.

### Variation in *Aster puniceus*.

Fernald (1950, p. 1428) noted that *Aster puniceus* is "one of our most intricately variable and wide-ranging species" and formally recognized five varieties within the range of his floristic treatment. He furnished keys to varieties and forms of the species in northeastern North America (Fernald 1899, 1950). Scoggin (1979), Strausbaugh & Core (1978), Seymour (1982), and others also have formally recognized a series of varieties and forms within *A. puniceus*, which Scoggin referred to as an "aggregate species." Taxa that have been recognized at varietal rank within *A. puniceus* are listed below (with general type localities).

- A. puniceus* var. *albiflorus* Farwell (Michigan);
- A. puniceus* var. *calderi* (Boivin) Lepage (Québec);
- A. puniceus* var. *calvus* Shinnery (West Virginia);
- A. puniceus* var. *colbyi* Benke (Wisconsin);
- A. puniceus* var. *compactus* Fern. (Massachusetts);
- A. puniceus* var. *demissus* Lindley (eastern North America);
- A. puniceus* var. *firmus* (Nees) Torrey & Gray (eastern North America);
- A. puniceus* var. *laevicaulis* A. Gray (eastern North America);

- A. puniceus* var. *lucidulus* A. Gray (Wisconsin)
- A. puniceus* var. *monocephalus* Farwell (Michigan);
- A. puniceus* var. *oligocephalus* Fern. (Labrador);
- A. puniceus* var. *perlongus* Fern. (Québec);
- A. puniceus* var. *puniceus* (eastern North America);
- A. puniceus* var. *purpureus* Pursh (eastern North America);
- A. puniceus* var. *rufescens* Pursh (eastern North America);
- A. puniceus* var. *scabricaulis* (Shinners) A.G. Jones (Texas);
- A. puniceus* var. *vimineus* Torrey & Gray (eastern North America).

Variable characters by which these entities have been recognized (as taken from the original descriptions and published keys) are primarily the following: cauline vestiture densely and uniformly hispid, hispid in lines, strongly reduced, or of loose, soft hairs; leaves subrhomboidal or greatly elongate; leaf surfaces hispid to glabrous, dull to shiny; leaf margins entire to serrate; capitulescence narrow or relatively broad, compact or open, with branches longer or shorter than the subtending bracteal leaves; bracteal leaves closely or widely spaced; heads numerous or few to solitary; peduncles to 6 mm long or mostly shorter; outer phyllaries 1 mm broad or up to 3 mm broad, sometimes foliaceous; disc corollas red or purple vs. yellow; and ray corollas blue, white, or reddish.

Shinners (1943, p. 348) observed that "Some of the named varieties [of *Aster puniceus*] are probably to be referred to hybrids with *A. foliaceus* or other species, others are hardly more than forms of the species itself." A number of these varieties have been formally reduced in rank to forms (e.g., Shinners 1941; Fernald 1949), but for the most part these entities have come to be accepted within the normal range of variability for *A. puniceus* and not accorded formal taxonomic recognition. Only var. *scabricaulis* among these is accepted here as a morpho-geographic variant formally recognized within the species.

*Aster puniceus* var. *firmus* (= *Aster firmus*) has been among the taxonomically most persistent varieties of *A. puniceus*, and only this variety was considered in cytological reviews of *A. puniceus* by Semple *et al.* (1983, 1992). Shinners (1941, p. 414) noted that "Wiegand is apparently correct in maintaining *Aster lucidulus* [= *A. firmus*] as a species distinct from *A. puniceus*, but it is not always very easy to distinguish the two. Characters of the internodes, leaves, pubescence, panicles, heads, and style branches are sufficiently inconstant to make it impossible to rely upon any of them." He later observed that *A. firmus* is "readily distinguishable from *A. puniceus* in the field by its habit of forming large beds from creeping rootstocks . . . ; by its densely leafy stem; and by its dense inflorescence" (Shinners 1945, p. 71). The *A. firmus* morphotype occurs in habitats similar to those of typical *A. puniceus* and the two taxa overlap in geographic range over a broad area, with *A. firmus* reported to occur from Québec south to West Virginia and North Carolina and westward to Iowa, Minnesota, and North Dakota.

When they are regarded as separate taxa, *Aster puniceus* and *A. firmus* are reported to intergrade (e.g., Barkley 1986; Mohlenbrock 1986; Jones 1989). Jones (1980b) provided a detailed comparison of these two taxa with the observation that they are strongly separated species, but she later (1984, 1987, 1989) took the view that intergradation with *A. puniceus* made varietal status for *A. firmus* more appropriate. Semple *et al.* (1983, p. 1434) observed that "There is a great range of



variation [in *A. puniceus*] in stem pubescence, floret color, leaf color, and rhizome morphology. . . . We could find no non-arbitrary way to separate collections on the basis of [these features]." Steyermark (1963) and Fisher (1988) reached generally the same conclusion for *A. puniceus* in Missouri and Ohio, respectively, and Labrecque & Brouillet (1996) have agreed.

Plants of *Aster puniceus* in the southern Appalachians and adjacent piedmont are more uniform in morphology, with but few populations showing features of *A. firmus*. One example is the type of *A. conduplicatus* Burgess (from Buncombe Co., N.C.), which has upper stem vestiture reduced to hairs in lines and a somewhat congested capitulescence suggestive of *A. firmus*.

#### Comparison of *Aster scabricaulis* and *Aster puniceus*.

Brief descriptions of *Aster scabricaulis* have been published by Shinnery (1953) and Correll & Johnston (1970); a full technical description is furnished below.

Shinnery (1953) observed similarities in *Aster scabricaulis* with both *A. puniceus* and *A. firmus*. *Aster scabricaulis* resembles typical *A. puniceus* in many features, including cauline vestiture and its production of short thick rhizomes, features that have been used to distinguish the latter from the *A. firmus* morphotype. Plants of *A. scabricaulis*, like *A. puniceus*, are perennials producing short rhizomes, the stems arising singly or in close clusters, mostly 4-8 feet tall (*A. puniceus* grows up to 9 feet tall), producing numerous branches above the middle and often bearing hundreds of heads. Stems of older plants are purple, commonly with secondary growth, and up to 15 mm thick at the base. The stem vestiture below the inflorescence usually is hispid-villous, of relatively thick hairs 0.5-1.2 mm long, and densely and uniformly distributed around the stem. In some plants of *A. scabricaulis* from Wood County (Nixon 13969; Nesom A95-10; Poole 4280) and Smith County (Poole 4281, 4282), the upper stem vestiture is strongly reduced in density with the hairs in lines, similar to the *A. firmus* morphotype. Also similar to *A. firmus*, there is a tendency in *A. scabricaulis* for the capitulescence to be noticeably condensed with heads on relatively short peduncles and for the leaves of the capitulescence (bracteal leaves) to be more numerous and reduced in size compared to the lower cauline leaves. In the original description of *A. scabricaulis*, Shinnery was not specific about its putative intermediacy between *A. puniceus* and *A. firmus*, but his description of the heads of *A. scabricaulis* as "rather numerous and crowded" matches his characterization of *A. lucidulus* (= *A. firmus*), with "short upper internodes [and] a dense and compact inflorescence."

*Aster scabricaulis* can be separated from *A. puniceus* (including *A. firmus*) over all of its range by features of its cauline and bracteal leaves (see key below). The morphological features that characterize *A. scabricaulis* are not unique to it within *A. puniceus*, especially if *A. firmus* is included, but the combination is consistent within *A. scabricaulis* and it contrasts with the morphology of var. *puniceus* from the Appalachian area of the eastern U.S. In the plants from Mississippi and Louisiana, the lower leaf surfaces are green but there is a slight darkening of the veiny reticulum, and the upper surfaces do not have distinctly impressed veins. The upper cauline and

bracteal leaves, however, are conspicuously reduced in size, and these plants are more like the Texas ones than those of typical var. *puniceus*. Plants of the coastal plain (var. *scabricaulis*), with warmer temperatures and a longer growing season, might also be inferred to be physiologically differentiated from those of the main range of *A. puniceus*. *Aster scabricaulis* is treated here at varietal rank as a morpho-geographic variant within *A. puniceus*, emphasizing its overall similarity but recognizing its segregation in geography and geological substrate and relatively slight though consistent morphological differences.

The following key summarizes the main differences among the taxa of concern in the present study.

1. Leaf bases tapered to a non-clasping base, or sometimes subclasping but never auriculate; rays pinkish, or mostly bluish in South Carolina southward and westward; swamp and marsh edges of the outer coastal plain, Virginia to Florida, then west to south-central Louisiana.....*A. elliotii*
1. Leaf bases auriculate-clasping; rays bluish or purplish, rarely white or slightly pink; wet meadows, bogs, marshes, and low woods of inner continent -- mountains, piedmont, inner coastal plain, rare on outer coastal plain. .... (2)
  2. Stems nearly glabrous or glabrescent in the lower half, hirsute or sparsely hispidulous in lines in the upper portion; lower leaf surface glabrous or sparsely scabrous along the midrib; leaves of the inflorescence conspicuously crowded; phyllary apices short-attenuate or often acute to obtuse; rhizomes long, stoloniform..... *A. firmus* morphotype
  2. Stems hispidulous over the entire length, the indument usually distributed uniformly around the stem but sometimes less dense and in lines; lower leaf surface glabrous to minutely strigillose or hispidulous, the midrib hispidulous or densely hirsute to villous; leaves of the inflorescence not conspicuously crowded; phyllary apices generally long-attenuate; rhizomes short, thick and fleshy..... *A. puniceus* (3)
3. Lower leaf surface distinctly lighter colored than the upper surface, with a distinct reticulum of dark colored veins; main veins of upper leaf surface not impressed; leaves of the capitulescence variable but mostly nearly equal in size to those lower on the stems.....*A. puniceus* var. *puniceus*
3. Lower leaf surface about the same color as the upper surface, without a strongly evident reticulum of dark colored veins; main veins of upper leaf surface shallowly but distinctly impressed, imparting a slightly rugose appearance; leaves of the capitulescence usually more numerous and distinctly reduced in size compared to the lower. ....*A. puniceus* var. *scabricaulis*

#### Chromosome numbers.

The chromosome number of var. *scabricaulis* has been reported as  $2n=16$  (Smith County, TX; Jones 1984). Chromosome numbers of  $2n=16$  (diploid) and  $2n=32$  (tetraploid) have been reported for populations of var. *puniceus* (Jones 1980b; Semple 1985; Semple *et al.* 1983 and references therein; Semple *et al.* 1989; Semple *et al.* 1992; Semple *et al.* 1993; Semple *et al.* 1996). As documented in the studies by Semple and colleagues, diploids occur over the entire range of *A. puniceus*; the

tetraploids are uncommon and found only along the western margin of the range, in Illinois, Iowa, Wisconsin, Minnesota, and a few in northwestern Ontario. "No relationship between ploidy level and any particular morphotype has been demonstrated" (Semple *et al.* 1996, p. 74). The *Aster firmus* morphotype has been reported as diploid and tetraploid (Jones 1980b).

*Aster puniceus* var. *scabricaulis* hybrids.

Putative hybrids between var. *scabricaulis* and *A. lateriflorus* have been collected in east Texas. *Aster puniceus* × *A. lateriflorus* hybrids have also been reported by Semple *et al.* (1996). Although the parentage apparently is similar, the putative Texas hybrids are somewhat different from each other in morphology.

\* Var. *scabricaulis* × *A. lateriflorus* (Henderson County: Poole 4285).

This plant is most like var. *scabricaulis* in characters of habit, capitulescence, and involucre but differs from it primarily in the following ways: the phyllaries are graduated in length and the apices broader; the stem pubescence is of relatively fine, crisped hairs; the basal auriculation of the leaves is not so pronounced; the ray corollas are pale blue rather than dark blue; and the entire limb of the disc corollas is purple, abruptly widened at the tube/throat junction, and the corolla lobes are about half the length of the limb. The only other aster present at this locality was *A. lateriflorus* (Poole 4284 [SHST]). The habit and overall morphology of Poole 4285 is little suggestive of *A. lateriflorus*, but the distinctive disc corolla morphology, particularly, of the putative hybrid and the proximity of the putative parents suggests that a contribution of genes from this species was involved.

\* Var. *scabricaulis* × *A. lateriflorus* (Anderson County: Nesom A95-2, A95-5).

Var. *scabricaulis* and *Aster lateriflorus* were the only two asters present at this locality. Nesom A95-1 is typical var. *scabricaulis*. Nesom A95-2 has considerably smaller heads without elongated outer phyllaries and they are arranged nearly cylindrically at the stem apices, the disc corollas are shorter (3.5-4.0 mm long) with longer lobes, and the leaves are barely subclasping at base. Nesom A95-5 is a plant more nearly typical of *A. lateriflorus*, especially in involucre and floral features, but the largest cauline leaves are broad and firm (nearly identical to those of Nesom A95-2) and the stems have relatively short flowering portions, suggestive of genetic influence from var. *scabricaulis*.

Technical description: *Symphotrichum puniceum* var. *scabricaule*.

*Aster scabricaulis* Shinnery, Field & Lab. 21:156. 1953. (BASIONYM). TYPE: UNITED STATES. Texas: Smith County, 16 mi NW of Tyler [courthouse], 19

Oct 1947, *L.H. Shiners 9504* (HOLOTYPE: SMU!). *Aster puniceus* L. var. *scabriculaulis* (Shiners) A.G. Jones, *Phytologia* 55:384. 1984. *Symphotrichum puniceum* (L.) Nesom var. *scabricaule* (Shiners) Nesom, *Phytologia* 77:290. 1994.

Perennial herbs from short, thick rhizomes. Stems arising singly or in close clusters, mostly 4-8 feet tall, producing numerous branches above the middle, those of the older plants purple, woody, and up to 15 mm thick at the base, cauline vestiture usually hispid-villous, of relatively thick hairs 0.5-1.2 mm long, densely and uniformly distributed around the stem, the upper cauline vestiture reduced and in lines in some Wood County populations. Leaves chiefly cauline, lanceolate to lance-oblong or oblanceolate, petiolate, and auriculate-clasping, (3.5-)10-13 dm long, minutely and evenly scabrous above and beneath or the vestiture relatively reduced beneath, the margins often narrowly revolute, serrate with strongly antrorse, indurate-tipped teeth. Capitulescence relatively condensed as corymbiform clusters of heads near the branch tips, a large plant often bearing hundreds of heads, the heads on relatively short peduncles, bracteal leaves 10-25 mm long, these similar in shape and margin to those lower on the stems but distinctly more closely arranged and markedly reduced in size. Heads 6-10 mm broad; involucre bracts sparsely and minutely puberulent and ciliate to glabrous, linear, in 4-5 series of subequal length, the inner 6-8 mm long with the apical green portion ca. 1/4 the length of the phyllary and extending into a linear-subulate apex, the outer slightly shorter and often loose to strongly divergent or recurving, with the apical green portion 1/2-2/3 the phyllary length; receptacles shallowly membranous-foveolate. Ray flowers 20-34, the corollas 10-12 mm long, the tube ca. 2 mm long, the ligules blue, 1.0-1.6 mm wide, strongly coiling at maturity. Disc corollas yellowish, 4.0-5.5 mm long, narrowly funnelform to nearly cylindrical, the tube 1.8-2.0 mm long, very slightly widened into the limb, the lobes erect to spreading, 0.6-1.1 mm long, purplish at maturity; collecting appendages of the style branches narrowly triangular, 0.3-0.5 mm long, hairy, ca. 30-40% of the style branch length. Achenes 2.1-3.0 mm long, narrowly oblong-oblanceolate, flattened, 4(-5) nerved (with a nerve on each edge and 1[-2] on each face), tan or commonly purplish at maturity, glabrous to sparsely short-strigose; pappus bristles 35-48 in a single series, about as long as the disc corollas.

Specimens examined: *Symphotrichum puniceum* var. *scabricaule*.

Louisiana. [NATCHITOCHE PARISH]: "pine woods," Natchitoches, Oct [1910], *R.S. Cocks s.n.* (NO--photocopies NLU, SHST).

Mississippi. GRENADA COUNTY: locally common in sphagnum bog, ["ca. 2.5 mi NNW of Gore Springs, in a boggy springhead"], T22N R6E W 1/2 Sec. 12, with *Cacalia lanceolata*, *Eryngium integrifolium*, *Oxypolis rigidior*, *Solidago patula*, *Habenaria clavellata*, *Habenaria ciliaris*, *Gentiana saponaria*, *Chelone glabra*, 7 Oct 1986, *Morris 2679* (NLU; others at SWSL, VDB, *fide* C. Bryson); ca. 4 mi SE of Gore Springs, T21N, R7E, S4, NE4, North Central Plateau, in a sphagnum springhead bog, forming fairly large colonies, 9 Oct 1987, *Morris 3061* (IBE-2 sheets, base and capitulescence). LAUDERDALE COUNTY: Hwy 11, 5 mi N Clarke Co. line, ca. 1 mi N Savoy, NW4, S9, low open area with *Salix nigra* [wet

area between highway and RR], locally common, 14 Oct 1978, *McDaniel 22172* (IBE-2 sheets).

Texas. ANDERSON COUNTY: Gus Engeling Wildlife Management Area, NW of Palestine, boggy area SE of Lake 2, 16 Oct 1993, *Dubrulle 1348* (TAMU); Texas State Railroad Historical Park, 10 mi E of Palestine [between Rusk and Palestine, off Hwy 84], between mileposts 22 and 23, closer to 22 (1.0 mi E of jct of RR and Co. Rd. 386), open marsh with dense emergent vegetation crossed by railroad, 23 Oct 1975, *Lodwick 383* (BRIT); ca. 1 mi E of Slocum on Texas Hwy 294, drainage area from small pond, 20 Oct 1983, *Nixon & Ward 12658* (ASTC,SHST,BRIT); 3.2-3.3 mi NNW of jct Hwys 3309 and 315 on W side of Hwy 315, near jct with Co. Rd. 358, natural marsh area mostly covered with *Typha*, outflow and roadside drainage, 20 Oct 1983, *Nixon 12661* (ASTC,SHST,BRIT), 15 Oct 1983, *Mahler 9690* (ASTC, BRIT), 30 Oct 1983, *Mahler 9709* (BRIT), 16 Oct 1995, *Nesom A95-1* (MISS, NLU,NO,SHST) and *Nesom A95-2* and *A95-5*, putative hybrids, see comments in text (SHST); ca. 2 mi NNW of jct of Hwys 3309 and 315 on Hwy 315, natural marsh to swamp area, 20 Oct 1983, *Nixon 12662* (ASTC,BRIT); Palestine, sandy open swamp, 15 Sep 1918, *Palmer 14584* (US). FRANKLIN COUNTY: ca. 1.7 mi E of jct Texas Rte 115 and Hwy 21 on Rte 115, S side of road, spring/seepage bog, 11 Nov 1996, *Singhurst 4926* (BAYLU). HENDERSON COUNTY: 1.6 mi NE of intersect of Hwys 31 and 317, SE side of the NE bound lane of Hwy 31, SW of the Athens Fish & Game Club Lake, NE of Athens, marshy drainage ditch (perhaps a remnant natural feature) between forest edge and hwy, 1 Nov 1995, *Poole 4283* (SHST) and *4285*, a putative hybrid, see comments in text (SHST); ca. 5.5 mi WSW of jct. of Hwy 31 and FM 1804, on S side of Hwy 31, deep xeric sand hill with spring seepage, 27 Oct 1995, *Singhurst 3903* (SHST). HOPKINS COUNTY: ca. 1.1 mi from jct Texas Rte 900 and FM 3019 on FM 3019, W side of road, spring/seepage bog, 11 Nov 1996, *Singhurst 4925* (BAYLU). SMITH COUNTY: 8 mi NE of Tyler, Camp Fannin, wet pockets at edge of meadow below hospital, 15 Oct 1943, *Moore 564* (US); ca. 0.4 mi SE of jct Hwys 110 and 2016 on Hwy 110 NW of Tyler, open seepage area along hwy above creek, 4 Nov 1983, *Nixon 12659* (ASTC,SHST, BRIT) and *Mahler 9710* (BRIT,TAMU); 1.8 mi E of intersect of I-20 and Hwy 14, N side of W-bound access road of I-20, damp, polluted drainage ditch (perhaps a remnant natural feature), 28 Oct 1995, *Poole 4281* (SHST); 0.6 mi N of intersect of Lake Park Drive and Hwy 110, E side of LP Drive, N side of Tyler, marshy drainage, 1 Nov 1995, *Poole 4282* (SHST); 0.5 mi S of jct of FM 849 (Co. Rd 431) and Co Rd 4118, N side of FM 849, just W of drainage between Stewart Lakes and Tomlin Lake, NW of Lindale, marshy drainage ditch at edge of woodland along hwy right-of-way, 3 Nov 1995, *Poole 4291* (SHST); 16 mi NW of Tyler [courthouse], 19 Oct 1947, *Shinners 9504* (HOLOTYPE: SMU). VAN ZANDT COUNTY: ca. 3.8 mi SSE of jct of Hwys 858 and 279 in Ben Wheeler on Hwy 279, drainage area from small lake, N end of lake, both sides of road, 26 Oct 1983, *Nixon & Ward 12663* (ASTC,SHST, BRIT), 12 Oct 1952, *Daly 157* (BRIT); 16 Oct 1995, *Nesom A95-8* (NCU,SHST, TEX). WOOD COUNTY: on Hwy 154 0.3 mi E of jct with Lake Lydia Road (FM 3230), 3.5 mi E of jct Hwys 154 and 37 E of Quitman, seepage area along open roadside, below earthen tank on N side of road, 13 Oct 1984, *Nixon 14006* (ASTC, BRIT), 15 Oct 1984, *Nixon 13969* (ASTC,SHST,BRIT); 16 Oct 1995, *Nesom A95-9* (SHST); on Hwy 154, 0.6 mi E [W] from its jct with Lake Lydia Road (FM 3230), open seepage along hwy for ca. 100 m, 13 Oct 1984, *Nixon 14005* (ASTC,SHST, BRIT); ca. 4.7 mi W of jct Hwys 14 and 154 on Hwy 154, open seepage area along road, 16 Oct 1984, *Nixon 14022* (ASTC); near Co. Rd. 3235 and its jct with the E

end of Lake Lydia, wet open creek bottom with ponds, 27 Oct 1984, *Nixon 14028* (ASTC,SHST,BRIT); edge of marsh on SE side of Lake Lydia on Co. Rd. 3235, across rd from housing development on edge of lake, 16 Oct 1995, *Nesom A95-10* (SHST,TEX); ca. 1.5 mi E of jct Hwy 778 and Co. Rd. 3860 on 3860 E of its jct with Red Branch, N side of road near E edge of pond, open seepages at margin of a woodland, 19 Oct 1984, *Nixon 14029* (ASTC,SHST,BRIT); ca. 0.8 mi N of jct Hwy 49 and Co. Rd. 3270 on 3270, open seepage area along roadside near creek, 3 Nov 1984, *Nixon 14030* (ASTC,BRIT); ca. 0.5 mi NE of jct Co. Rd. 3235 and 3245, ca. 100 m from Co. Rd. 3245, ca. 0.4 mi upstream from end of SE arm of Lake Lydia, marshy to brushy glades with springs and seepages, 27 Oct 1984, *Nixon 14038* (ASTC), Oct 1988, *Orzell & Bridges 8063* (TEX); 0.7 mi NNW of intersct of Hwy 14 and Co. Rd 3260 and 1.0 mi SSE of intersct of Hwys 14 and 154, E side of Hwy 14, S of Buck Creek, marshy drainage, 27 Oct 1995, *Poole 4279* (SHST); 0.3 mi E of intersct of Hwys 14 and 154, primarily on N side of Hwy 154, drainage of spring-fed marsh, 27 Oct 1995, *Poole 4280* (SHST); ca. 5 m NE of jct. of Loop 564 and Hwy 64 at Mineola, deep xeric sand hill with spring seepage, 1 Nov 1995, *Singhurst 4379* (SHST).

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#### LITERATURE CITED

- Barkley, T.M. 1986. Asteraceae, in Great Plains Flora Association, *Flora of the Great Plains*. Univ. Press of Kansas, Lawrence, Kansas.
- Correll, D.S. & M.C. Johnston. 1970. *Manual of the Vascular Plants of Texas*. Texas Research Foundation, Renner, Texas.
- Cronquist, A. 1980. *Flora of the Southeastern United States*, Vol. 1. Asteraceae. Univ. North Carolina Press, Chapel Hill, North Carolina.

- Fernald, M.L. 1899. Some undescribed and little-known varieties of *Aster* and *Solidago*. *Rhodora* 1:187-191.
- \_\_\_\_\_. 1949. Studies of eastern American plants. Some northern Astereae. *Rhodora* 51:93-103.
- \_\_\_\_\_. 1950. *Gray's Manual of Botany* (ed. 8). American Book Company, New York, New York.
- Fisher, T.R. 1988. *The Dicotyledoneae of Ohio: Asteraceae*. Ohio State Univ. Press, Columbus, Ohio.
- Gandhi, K.N. & R.D. Thomas. 1989. Asteraceae of Louisiana. *Sida, Bot. Miscell.* 4:1-202.
- Gleason, H.A. & A. Cronquist. 1991. *Manual of Vascular Plants of Northeastern United States and Adjacent Canada* (ed. 2). New York Botanical Garden, Bronx, New York.
- Gray, A. 1884. *Synoptical Flora of North America*. Ivison, Blakeman, Taylor, & Co. New York, New York.
- Jones, A.G. 1980b. Data on chromosome numbers in *Aster* (Asteraceae, with comments on the status and relationships of certain North American species. *Brittonia* 32:240-261.
- \_\_\_\_\_. 1984. Nomenclatural notes on *Aster* (Asteraceae)--II. New combinations and some transfers. *Phytologia* 55:373-388.
- \_\_\_\_\_. 1987. New combinations and status changes in *Aster* (Asteraceae). *Phytologia* 63:131-133.
- \_\_\_\_\_. 1989. *Aster* and *Brachyactis* in Illinois. *Illinois Nat. Hist. Survey Bulletin* 34(2):139-194.
- Kral, R. 1955. A floristic comparison of two hillside bog localities in northeastern Texas. *Field & Lab.* 13:47-69.
- Labrecque, J. & L. Brouillet. 1996. Biosystematique du complexe de l'*Aster novibelgii* (Asteraceae: Astereae) au Québec. *Canad. J. Bot.* 74:162-188.
- MacRoberts, B.R. & M.H. MacRoberts. 1988. Floristic composition of two west Louisiana pitcher plant bogs. *Phytologia* 65:184-190.
- \_\_\_\_\_. 1990. Vascular flora of two west Louisiana pitcher plant bogs. *Phytologia* 68:271-275.
- \_\_\_\_\_. 1991. Floristics of three bogs in western Louisiana. *Phytologia* 70:135-141.
- Mahler, W.F. 1984. Status Report: *Aster scabricaulis* Shinnars. Submitted to U.S. Fish & Wildlife Department. Copies on file at BRIT, TRIES, and Texas Natural Heritage Program.
- Mohlenbrock, R.H. 1986. *Guide to the Vascular Flora of Illinois* (rev. & enlarged ed.). Southern Ill. Univ. Press, Carbondale, Illinois.
- Morris, M.W. 1988. Noteworthy vascular plants from Grenada County, Mississippi. *Sida* 13:177-186.
- Nesom, G.L. 1994. Taxonomic overview of *Aster* sensu lato (Asteraceae: Astereae), emphasizing the New World species. *Phytologia* 77:141-297.
- Radford, A.E., H.E. Ahles, & C.R. Bell. 1968. *Manual of the Vascular Flora of the Carolinas*. Univ. North Carolina Press, Chapel Hill, North Carolina.
- Scoggin, H.J. 1979. *The Flora of Canada*. Part 4 - Dicotyledoneae (Loasaceae to Compositae). National Museum of Canada, Ottawa, Canada.
- Semple, J.C. 1985. Chromosome number determinations in fam. Compositae tribe Astereae. *Rhodora* 87:517-527.

- Semple, J.C., J.G. Chmielewski, & C.C. Chinnappa. 1983. Chromosome number determinations in *Aster* L. (Compositae) with comments on cytogeography, phylogeny and chromosome morphology. *Amer. J. Bot.* 70:1432-1443.
- Semple, J.C., J.G. Chmielewski, & M.A. Lane. 1989. Chromosome number determinations in fam. Compositae, tribe Astereae. III. Additional counts and comments on generic limits and ancestral base numbers. *Rhodora* 91:296-314.
- Semple, J.C., J.G. Chmielewski, & C. Xiang. 1992. Chromosome number determinations in fam. Compositae, tribe Astereae. IV. Additional counts and comments on the cytogeography and status of some species of *Aster* and *Solidago*. *Rhodora* 94:48-62.
- Semple, J.C., S.B. Heard, & C. Xiang. 1996. The Asters of Ontario (Compositae: Astereae). *Univ. Waterloo Biol. Series* 38:60.
- Semple, J.C., J. Zhang, & C. Xiang. 1993. Chromosome number determinations in fam. Compositae, tribe Astereae. V. Eastern North American taxa. *Rhodora* 95:234-253.
- Seymour, F.C. 1982. *The Flora of New England* (ed. 2). *Phytologia Mem.* 5:1-611.
- Shinners, L.H. 1941. The genus *Aster* in Wisconsin. *Amer. Midl. Naturalist* 26:398-420.
- \_\_\_\_\_. 1943. The genus *Aster* in Nova Scotia. *Rhodora* 45:343-350.
- \_\_\_\_\_. 1945. The genus *Aster* in West Virginia. *Castanea* 10:61-74.
- \_\_\_\_\_. 1953. Notes on Texas Compositae - IX. *Field & Lab.* 21:155-163.
- Steyermark, J.A. 1963. *Flora of Missouri*. Iowa State Univ. Press, Ames, Iowa.
- Strausbaugh, P.D. & E.L. Core. 1978. *Flora of West Virginia* (ed. 2). Seneca Books, Inc., Grantsville, West Virginia.
- Torrey, J.G. & A. Gray. 1841. *A Flora of North America*, Vol. 2., pt. 1. Wiley and Putnam, New York, New York.
- Wofford, B.E. & R. Kral. 1993. Checklist of the Vascular Plants of Tennessee. *Sida, Bot. Misc. No.* 10.